CLAIMS

What is claimed is:

1. A MEMS apparatus, comprising:

a substrate;

a passivation layer on the substrate, the passivation layer having a top surface; and

a microstructure suspended above the substrate, the microstructure having a bottom surface facing the top surface of the passivation layer;

wherein the passivation layer is patterned so that the top surface of the passivation layer is substantially different from the bottom surface of the microstructure.

2. The MEMS apparatus of claim 1, wherein the passivation layer is patterned to form a plurality of spaced protuberances.

3. The MEMS apparatus of claim 2, wherein the bottom surface of the microstructure is substantially flat.

4. The MEMS apparatus of claim 2, wherein at least one of the protuberances has a square cross section.

5. The MEMS apparatus of claim 2, wherein at least one of the protuberances has a rectangular cross section.

6. The MEMS apparatus of claim 2, wherein at least one of the protuberances has a hexagonal cross section.

7. The MEMS apparatus of claim 1, wherein the passivation layer is patterned to form a mesh.

8. The MEMS apparatus of claim 7, wherein the bottom surface of the microstructure is substantially flat.

9. The MEMS apparatus of claim 7, wherein the mesh is a square mesh.

10. The MEMS apparatus of claim 7, wherein the mesh is a hexagonal mesh.

11. The MEMS apparatus of claim 1, wherein the passivation layer comprises polyimide.

12. The MEMS apparatus of claim 1, wherein the passivation layer comprises silicon nitride.

13. A MEMS apparatus, comprising:

a substrate;

a passivation layer on the substrate, the passivation layer having a top surface;

a support attached to the substrate; and

a beam attached at one end to the support and suspended above the substrate, the beam having a bottom surface facing the top surface of the passivation layer;

wherein the passivation layer is patterned so that the top surface of the passivation layer is substantially different from the bottom surface of the beam.

14. The MEMS apparatus of claim 13, further comprising a second support attached to the substrate and wherein the beam is attached to the second support at a second end.

15. The MEMS apparatus of claim 13, further comprising a bottom electrode on the substrate and underneath the bottom surface of the beam.

16. The MEMS apparatus of claim 13, wherein the passivation layer is patterned to form a plurality of spaced protuberances.

17. The MEMS apparatus of claim 16, wherein the bottom surface of the microstructure is substantially flat.

18. The MEMS apparatus of claim 16, wherein at least one of the protuberances has a square cross section.

19. The MEMS apparatus of claim 16, wherein at least one of the protuberances has a rectangular cross section.

20. The MEMS apparatus of claim 16, wherein at least one of the protuberances has a hexagonal cross section.

21. The MEMS apparatus of claim 13, wherein the passivation layer is patterned to form a mesh.

22. The MEMS apparatus of claim 21, wherein the bottom surface of the microstructure is substantially flat.

23. The MEMS apparatus of claim 21, wherein the mesh is a square mesh.

24. The MEMS apparatus of claim 21, wherein the mesh is a hexagonal mesh.

25. The MEMS apparatus of claim 13, wherein the passivation layer comprises polyimide.

26. The MEMS apparatus of claim 13, wherein the passivation layer comprises silicon nitride.

27. A method of fabricating a MEMS structure, comprising the steps of:

depositing a passivation layer onto a substrate;

patterning a predetermined pattern into the passivation layer;

depositing a sacrificial layer onto the patterned passivation layer;

forming a microstructure on the sacrificial layer such that the microstructure overlaps the patterned passivation layer; and

removing the sacrificial layer to release the microstructure above the patterned passivation layer.

28. The method of claim 27, wherein the predetermined pattern comprises a plurality of spaced protuberances.

29. The method of claim 28, wherein at least one of the protuberances has a square cross section.

30. The method of claim 28, wherein at least one of the protuberances has a rectangular cross section.

31. The method of claim 28, wherein at least one of the protuberances has a hexagonal cross section.

32. The method of claim 27, wherein the predetermined pattern is a mesh pattern.

33. The method of claim 32, wherein the mesh is a square mesh.

34. The method of claim 32, wherein the mesh is a hexagonal mesh.

35. The method of claim 27, further comprising the step of baking the sacrificial layer prior to forming the microstructure to smooth out the top surface of the sacrificial layer.

36. The method of claim 27, wherein the step of patterning the passivation layer further comprises:

depositing a patterning layer onto the passivation layer;

patterning the predetermined pattern into the patterning layer;

transferring the predetermined pattern from the patterning layer to the passivation layer; and

removing the patterning layer.

37. The method of claim 37, wherein the patterning layer comprises photoresist.

38. The method of claim 27, wherein the step of patterning the passivation layer further comprises:

exposing the passivation layer to UV light through a photo mask having the predetermined pattern; and

selectively etching away portions of the passivation layer exposed to the UV light, thereby transferring the predetermined pattern to the passivation layer.

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